

MOUNTING FASTENER FOR A RACK

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BACKGROUND OF THE INVENTION

[0001] This section is intended to introduce the reader to various aspects of art, which may be related to various aspects of the present invention that are described and/or claimed below. This discussion is believed to be helpful in providing the reader with background information to facilitate a better understanding of the various aspects of the present invention. Accordingly, it should be understood that these statements are to be read in this light, and not as admissions of prior art.

[0002] In the computer industry, components are often mounted in a rack via fasteners, which couple to apertures along the legs of the rack. The two standard aperture shapes are round and square openings. As a result, the fasteners are different depending on the type of opening, i.e., round or square, disposed in the rack. This variation in mounting fasteners and apertures increases costs and complicates mounting of components, because multiple fasteners are provided to ensure mountability of the component with the different types of racks.

SUMMARY

[0003] A mounting fastener for a rack having a clip and a fastener coupled to the clip, wherein the fastener has a first shaped exterior adapted for insertion of the fastener into a first shaped aperture of the rack. The mounting fastener also includes a mounting adapter selectively disposed adjacent the fastener, wherein the mounting adapter has a second shaped exterior adapted for insertion of the adapter into a second shaped aperture of the rack.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0004] Advantages of one or more disclosed embodiments may become apparent upon reading the following detailed description and upon reference to the drawings in which:
- [0005] FIG. 1 is an exploded perspective view of a fastener assembly and a rack-mountable device exploded from a rack in accordance with embodiments of the present invention;
- [0006] FIG. 2 is a partial perspective view illustrating the rack and the fastener assembly in accordance with embodiments of the present invention;
- [0007] FIG. 3 is a perspective view of the fastener assembly in accordance with embodiments of the present invention;
- [0008] FIG. 4 is a bottom view of the fastener assembly in accordance with embodiments of the present invention;
- [0009] FIG. 5 is a side view of the fastener assembly in accordance with embodiments of the present invention;
- [0010] FIG. 6 is a perspective view of an adapter for the fastener assembly in accordance with embodiments of the present invention; and

[0011] FIG. 7 is a partial perspective view illustrating a leg of the rack and the fastener assembly in accordance with embodiments of the present invention.

DETAILED DESCRIPTION

[0012] One or more specific embodiments of the present technique will be described below. In an effort to provide a concise description of these embodiments, not all features of an actual implementation are described in the specification. It should be appreciated that in the development of any such actual implementation, as in any engineering or design project, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which may vary from one implementation to another. Moreover, it should be appreciated that such a development effort might be complex and time consuming, but would nevertheless be a routine undertaking of design, fabrication, and manufacture for those of ordinary skill having the benefit of this disclosure.

[0013] FIG. 1 is an exploded perspective view of a rack assembly 2 having a threaded clip fastener assembly 4 and a rack-mountable device 6, exploded from the rack assembly 2, in accordance with embodiments of the present invention. The illustrated fastener assembly 4 comprises a threaded clip fastener 8 and a mounting aperture adapter 10. As discussed in detail below, the threaded clip fastener 8 and mounting aperture adapter 10 facilitate attachment of the fastener assembly 4 to different types of rack assemblies 2. For example, the threaded clip fastener 8 alone is mountable to a round opening, while inclusion of the mounting

aperture adapter 10 with the threaded clip fastener 8 facilitates mounting to a square opening. Therefore, the fastener assembly 4 facilitates coupling of an attachable apparatus, such as device 6, to the rack assembly 2 with either a round or a square-shaped configuration of apertures 12 disposed on a leg or rack structure 14 of the rack assembly 2.

[0014] The illustrated rack assembly 2 has a four-legged frame, which forms the rack structure 14. Other embodiments of the rack assembly 2 may have different configurations and components, such as a two-legged frame, shelves, outer housing panels, electrical wiring, and so forth. Thus, the rack assembly 2 generally provides support and storage for a number of different types of components, as represented by device 6. For example, device 6 may comprise a server, power supply, stereo component, control system, programmable logic controller, input device, display device, or other electronic or computer components. Moreover, the apertures 12 of the rack structure 14 may have different geometries or mounting configurations, such as a square, rectangular, polygonal, triangular, key-hole, oblong, or other shaped-opening.

[0015] The fastener assembly 4 facilitates coupling of an attachable apparatus, such as the device 6, with multiple different rack assemblies 2 by adapting the threaded clip fastener 8 to those different shaped apertures 12. Such cooperation may be facilitated by insertion or removal of the mounting aperture adapter 10 from a position within the threaded clip fastener 8. In other words, the fastener assembly 4 facilitates coupling to one shaped aperture 12 (e.g., a round opening) using the threaded clip fastener 8 alone, and facilitates coupling to a

different shaped aperture 12 (e.g., a square opening) with the mounting aperture adapter 10 coupled to the threaded clip fastener 8.

[0016] In the illustrated embodiment, the fastener assembly 4 also facilitates coupling of the device 6 to the rack structure 14 by ensuring cooperation between a bolt 16, the aperture 12, and the threaded clip fastener 8 (e.g., a threaded hole in the fastener). Specifically, FIG. 1 illustrates the device 6 having a mounting ear 18, which aligns with the aperture 12. During mounting, the bolt 16 passes through a hole in the mounting ear 18 and engages the threaded clip fastener 8 and the aperture 12 of the rack structure 14. In one embodiment, threads on the bolt 16 engage or interlock with threads on the threaded clip fastener 8 to secure the device 6 to the rack structure 14. Again, depending on the particular configuration of the aperture 12 (e.g., round or square), the optional mounting aperture adapter 10 cooperates with the threaded clip fastener 8 to facilitate coupling of the threaded clip fastener 8 and device 6 to the rack structure 14. In the illustrated embodiment, the aperture 12 has a round shape and the threaded clip fastener 8 alone is configured for this round shape. Thus, the optional mounting aperture adapter 10 is not disposed within the threaded clip fastener 8. However, other embodiments may have different shapes of the aperture 12, which can conformingly receive the threaded clip fastener 8 without the mounting aperture adapter 10.

[0017] FIG. 2 is a partial perspective view illustrating the rack structure 14 and the threaded clip fastener 8 in accordance with embodiments of the present invention. As illustrated, the aperture 12 has a round or circular configuration 20, which receives a central boss or cylindrical member (i.e., boss portion 44 of Fig. 5).

of the threaded clip fastener 8 without the mounting aperture adapter 10. However, as mentioned above, alternative embodiments of the threaded clip fastener 8 may have a central member of another shape, such as a square, rectangular, polygonal, triangular, or oval shape, which conforms to a particular configuration of the aperture 12. For illustrative purposes, the threaded clip fastener 8 is shown in both clipped 22 and unclipped 24 positions relative to the rack structure 14. During assembly, this central boss or cylindrical member extends through and substantially conforms to the circular configuration 20 as the threaded clip fastener 8 wraps around opposite sides of the rack structure 14 over the aperture 12.

[0018] FIG. 3 is a perspective view of the threaded clip fastener 8 in accordance with embodiments of the present invention. Specifically, FIG. 3 illustrates the threaded clip fastener 8 comprising a threaded hole 30 extending through a U-shaped clip body 32. The threaded hole 30 also extends through an interior L-shaped support structure 33, which supports a boss member 44 (see Fig. 5) having the threaded hole 30. Surrounding the L-shaped support structure 33 and the boss member 44 (see Fig. 5), the U-shaped clip body 32 has a lip 34, a spine 36, and a base 38 forming a resilient U-shaped structure. The lip 34 further comprises a plurality of angled sections 40, which progressively close onto the base 38. Thus, the U-shaped clip body 32 of this embodiment facilitates sliding engagement of the threaded clip fastener 8 about the rack structure 14 until the tongue 33 contacts the edge of the rack structure 14 (See FIGS. 2 and 3). In certain embodiments, the engagement between the tongue 33 and the edge of the rack structure 14 facilitates anti-rotation control of the threaded clip fastener 8, thereby facilitating threaded engagement of the threaded hole 30 with the bolt 16. Additionally, the plurality of

angled sections 40 resiliently compress the threaded clip fastener 8 about the rack structure 14 to secure the threaded hole 30 in alignment with the aperture 12. For example, the U-shaped clip body 32 may comprise a material, such as stainless steel, spring steel, or even plastic. Other embodiments of the threaded clip fastener 8 may comprise different geometric configurations and materials.

[0019] FIG. 4 is a bottom view of the threaded clip fastener 8 in accordance with embodiments of the present invention. Specifically, FIG. 4 illustrates eyelets 42, which attach the threaded hole 30 to the U-shaped clip body 32. However, other embodiments of the threaded clip fastener 8 may have an integral nut, latching mechanism, or other tool-based or tool-free mechanisms. For example, the threaded hole 30 may be tapped directly into the base 38 of the threaded clip fastener 8.

[0020] FIG. 5 is a side view of the threaded clip fastener 8 in accordance with embodiments of the present invention. Specifically, FIG. 5 illustrates a boss portion 44 and a footing 46 of the U-shaped clip body 32. During mounting, the threaded clip fastener 8 slidably and springably extends about the rack structure 14 in alignment with the aperture 12, such that the boss portion 44 fits into the aperture 12 (see positions 24 and 22 in FIG. 2). In this embodiment, a round-shaped boss portion 44 facilitates secure attachment within the correspondingly round-shaped aperture 12. However, other embodiments of the boss portion 44 may comprise a different shape, which is adapted to fit a particular configuration of the aperture 12. For example, the boss portion 44 may have a square, rectangular, polygonal, triangular, boss-shaped, hook shaped, oblong, or other shaped-structure.

[0021] FIG. 6 is a perspective view of the optional mounting aperture adapter 10 in accordance with embodiments of the present invention. Specifically, FIG. 6 illustrates an embodiment of the mounting aperture adapter 10 having a base portion 60, a raised square portion or boss 62, a clip portion 64, and a round opening 66. Inserted within the threaded clip fastener 8 (not shown), the mounting aperture adapter 10 wraps the round opening 66 about the boss portion 44 (see Fig. 5), such that the mounting aperture adapter 10 changes the round-shaped exterior of the boss portion 44 to the square-shaped exterior of the raised square portion 62. As discussed below with reference to Fig. 7, this raised square portion 62 extends through and conforms to a square-shaped aperture 12, while the U-shaped clip body 32 of the threaded clip fastener 8 wraps around the rack structure 14. Other embodiments of the optional mounting aperture adapter 10 may have other shapes for the raised portion 62, thereby facilitating adaptation to other shapes of the aperture 12.

[0022] FIG. 7 is a partial perspective view illustrating the rack structure 14 and the fastener assembly 4 in accordance with embodiments of the present invention. Specifically, FIG. 7 illustrates an embodiment of the rack structure 14 comprising a square contour 70 of the aperture 12. As illustrated in FIG. 7, embodiments of the threaded clip fastener 8 and mounting aperture adapter 10 are shown in both an unattached position 71 and an attached 72 position relative to the rack structure 14.

[0023] In the illustrated embodiment of FIG. 7, the mounting aperture adapter 10 slidably engages the threaded clip fastener 8 and the clip portion 64 extends

springably around the boss portion 44. Thus, the square portion 62 surrounds the boss portion 44 for insertion into the square contour 70 of the aperture 12. In certain embodiments, the mounting aperture adapter 10 may comprise material that facilitates attachment by being tacky, flexible, malleable, or elastic. For example, the mounting aperture adapter 10 may comprise plastic, stainless steel, or spring steel. Further, the opening 66 provides some flexibility in the clip portion 64, thereby facilitating elastic expansion and contraction about the boss portion 44.

[0024] During mounting of the threaded clip fastener 8, the raised square portion 62 fits geometrically within the square contour 70 of aperture 12 on the rack assembly 2, thereby facilitating mounting with the rack structure 14 as demonstrated by the attached position 72. In other words, this square fit between the raised square portion 62 and the square contour 70 functions both to retain the threaded clip fastener 8 at the aperture 12 and, also, to prevent rotation of the threaded clip fastener 8 as the bolt 16 threads into the threaded hole 30. As discussed above, the attached position 72 of the fastener assembly 4 also facilitates secure coupling of the rack-mountable device 6 to the rack assembly 2. Again, other embodiments of the raised portion 62 may comprise a shape different from the contour 70, such as discussed above.

[0025] While the invention may be susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and will be described in detail herein. However, it should be understood that the invention is not intended to be limited to the particular forms disclosed. Rather, the invention is to cover all modifications, equivalents and

alternatives falling within the spirit and scope of the invention as defined by the following appended claims.